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Crystal Springs Bypass (Polhemus) Tunnel

Project Management Plan

Prepared for:
San Francisco Public Utilities Commission
Utilities Engineering Bureau

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San Francisco Water Alliance

a joint venture of
Bechtel Infrastructure Corporation
The Jefferson Company
Sverdrup Civil, Inc.

April 19, 2002

Mr. Michael E. Quan – Manager
Utilities Engineering Bureau
1155 Market Street
San Francisco, CA 94103

In reply, please refer to: CCN 1528

Subject: **Task Order 51-2: Crystal Springs Bypass (Polhemus) Tunnel Final Preliminary Engineering Report**

Dear Mike:

We are pleased to submit the final preliminary engineering report for the subject project. A draft report was submitted for SFPUC/UEB review on 8 March 2002.

It is our understanding that this final report submittal satisfies the deliverable requirements of Task Order 51-2. The final report has incorporated all of the comments received from SFPUC staff. A comments/response submittal was prepared, prior to the completion of this final report, and submitted to all reviewers on 5 April 2002.

As always, we are available to assist you in any way with this submittal. Should you have any questions, please feel free to contact me at 415-554-7678 or SFWA Task Order Manager LuAnn McVicker at 415-554-7892 at any time.

Regards,

Jeff Brunetti – Acting Program Director
San Francisco Water Alliance
875 Stevenson Street, 3rd Floor
San Francisco, CA 94103

JJB/LMcV/fmc

Enclosure

cc: Bajwa, J.
Mavroudis, T.
Kohgadai, M.
Tam, R.

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Crystal Springs Bypass (Polhemus) Tunnel

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SFPUC
CRYSTAL SPRINGS BYPASS (POLHEMUS) TUNNEL

1 PROJECT OVERVIEW

1.1 Introduction and Purpose

The purpose of the Crystal Springs Bypass (Polhemus) Tunnel project is to provide a reliable component of the Water Supply & Treatment Division's (WS&TD) water system, not susceptible to the seismic vulnerabilities that the existing Crystal Springs Bypass Pipeline (CSBP) is, in San Mateo County, California. This project plan is intended to provide a "roadmap" for the anticipated tasks throughout the project from the present time through detail design, construction, and project close-out. This plan should be viewed as a "living document", subject to updates as the project progresses.

This project plan includes (1) Project Overview, discussing the project background and purpose, (2) Project Organization, listing the project team members, their roles and responsibilities, and displayed in an organization chart, (3) Project Tasks, discussing each of the tasks and subtasks, and (4) Project Budget and Schedule.

2 PROJECT ORGANIZATION

2.1 *SFPUC Project Team Members*

SFPUC Project Team

- SFPUC Project Manager – Tasso Mavroudis
- Utilities Engineering Bureau (UEB) Project Engineer – Mohammad Kohgadai

Jeet Bajwa is responsible for the Program Management Contract and Mike Quan is the UEB Manager. Water Supply and Treatment Division (WS&TD) is the project client.

SFPUC Support Team

- Resident Engineer
- BERM Representatives/Regulatory Environmental Support
- Surveyors

- Public Affairs Representative
- Land Management Resource Group
- Legal Counsel
- Health and Safety Advisor/Inspector

2.2 Specialists Project Team

- Project Management Specialist (formerly San Francisco Water Alliance, SFWA)
- Environmental Specialist
- Public Affairs Specialist
- Tunnel Designer
- Civil/Geotechnical Engineer
- Construction Contractors/Subcontractors
- Construction Management Specialist (Schedulers/Cost Estimators)

2.3 Project Phases

The project has been subdivided into general phases as follows:

- Phase I – Preliminary Engineering
- Phase II – Initiation of Pre-Design and Design
- Phase III – Pre-Design
- Phase IV – Detail Design
- Phase V - Procurement
- Phase IV - Construction
- Phase VII – Close-Out

Figure 1 Crystal Springs Bypass (Polhemus) Tunnel Functional Responsibility Matrix

y: Primary Responsibility Support Responsibility Approval Must be Informed	SFPUC – UEB Project Team T. Mavroudis, PM M. Kohgadai, PE	SFPUC Support Team	Project Management Specialist (formerly SFWA)	Environmental & Public Affairs Specialists	Tunnel Designer	Civil/ Geotechnical Engineers	Construction Contractor/ Subs/ Schedulers	Construction Management Consultant
ndamental Tasks/ cisions								
ase I – Preliminary gineering	3		1					
ase II – Initiation of -Design and Design	2/3	2	1					
ase III – Surveying	4	1	2					
ase III - Right-of-Way ues	3	1	2					
ase III - Primary otechnical aracterization	3	2	2			1		
ase III - Siphon aluation	2		2			1/2		
ase III – Environmental d Public Outreach	3	2	2	1				
ase VI - Detail Design	3	4/2	2		1	2		
ase V - Procurement	1	4	2					
ase VI - Construction	3	2	2		2		1	1
ase VII - Close Out	1	2	2		2		2	2

2.4 *Project Team Responsibilities*

2.4.1 SFPUC Project Manager

The SFPUC Project Manager (SFPUC PM) will identify a project management team to manage, coordinate, and administer the project from it's conceptual stages through planning, environmental, detail design, construction, and contract close out. The major responsibilities of the SFPUC PM include:

- Obtaining senior management approval and decisions;
- Maintaining constant flow of communication with UEB, consultants, and contractors using tools such as the monthly progress report and project review meetings, cost and schedule status, forecasts, and critical items awareness and notification reports;
- Defining major tasks;
- Supervising budget and schedule development;
- Monitoring project progress and initiating action to assure that schedules are met and work is performed within budget;
- Participating in public meetings, as needed, to provide project background and any technical information required;
- Coordinating monthly progress meetings for technical and progress reports reviews;
- Identifying project constraints and recommending actions to mitigate adverse effects on the project or take advantage of opportunities to improve performance and advance the completion of the work.

The responsibilities of the project management team will include the following:

- Establishing project team organization;
- Implementing UEB procedures to ensure efficient coordination of the various work functions and to facilitate interfaces;
- Planning all project activities and develop an overall schedule to meet project milestones and objectives;
- Reviewing, monitoring, and controlling project progress to ensure timely availability of information needed to meet schedule milestones for all project tasks;
- Monitoring and controlling construction progress and contract administration from bid to contract close-out including early identification and solution of problems;
- Performing regular monitoring of the construction management activities to ensure that project implementation conforms with safety, laws, regulations, and permit requirements;
- Ensuring compliance with Human Rights Commission, Arts Commission, and other City Policies; and

- Preparing regular detailed reports on progress/status of the project, cost forecasts, and cash flow during Project Management.

2.4.2 UEB Project Engineer

The UEB Project Engineer (UEB PE) is responsible for planning and coordinating all design tasks. The UEB PE has full technical responsibility for interpreting, organizing, executing, and coordinating assignments, as well as interacting with the consultants. Major responsibilities include:

- Planning all engineering activities, and responsible for execution of all engineering tasks and subtasks;
- Coordinating project planning to provide technical guidance in the engineering and construction reviews of the project;
- Reviewing project schedules and identifying engineering staffing and contracting requirements;
- Ensuring that sufficient and appropriate engineering resources are used on the project;
- Reviewing and approving engineering documents prepared by project consultants;
- Reviewing engineering drawings and specifications;
- Reviewing changes and deviations from project scope, budget, or schedule; and
- Interfacing with the UEB Resident Engineer for all construction-related activities.

2.4.3 SFPUC Support Team

2.4.3.1 UEB Resident Engineer

The UEB Resident Engineer (UEB RE) is responsible for planning, organizing, and directing all project construction activities and ensuring that all construction operations are in compliance with design and specifications and completed on schedule, within budget, and to quality standards. The UEB RE will be the primary City contact for all construction field activities. Major responsibilities include:

- Working closely with the SFPUC PM on the overall work and representing the SFPUC PM in his/her absence;
- Coordinate and consult with client operating department (WS&TD) on a continual basis;
- Interface with the UEB PE for all construction related activities;
- Coordinating all job site activities, including the actions of subcontractors, suppliers, and their representatives;
- Coordinating and overseeing the activities of the Construction Management Specialist;
- Providing constructability review during design;

- Establishing and managing site safety, environment, and security policy;
- Coordinating all job site contractual activities;
- Signing waste manifests for materials shipped off-site;
- Planning and directing orderly closeout of project construction activities; and
- Preparing a final project constructability report at the end of the project. This report will provide input and lessons learned for subsequent projects.

The UEB RE, along with the Construction Management Specialist, will establish a Construction Management Team consisting of a UEB inspector, SFPUC Health and Safety Advisor, a Scheduler, and a Health and Safety Monitoring Inspector. The Construction Management Team is responsible for:

- Establishing, in conjunction with UEB, site-specific policies and regulations regarding access to work areas, safety, security, work rules, contractors' safety programs, emergency evacuation procedures, and general working conditions. The team will institute and administer these policies;
- Establishing with UEB, the extent and type of temporary construction facilities and utilities required for the jobsite;
- Managing and overseeing the construction work performed by contractors including pre-construction review of the contract documents per contract provisions;
- Arranging for proper management for off-loading, receipt, inspection, warehousing, inventory control, and security of equipment and supplies at the jobsite;
- Ensuring that contractors execute construction activities in compliance with plans, permits, budgets, and drawings and specifications. Evaluating and resolving interface issues between contractors and/or physical interference problems to minimize operational work disruptions;
- Ensuring that contractors perform quality control inspections including recording results, as may be required, for substantiation that the work performed is in compliance with applicable criteria, project procedures, codes, and drawings and specifications;
- Monitoring contractors' performance and developing plans to maintain schedule. Arranging for periodic meetings with contractors to discuss progress, areas of concern, and schedule work plans;
- Administering and controlling contractors' changes and extra work claims;
- Checking, verifying, and processing contractors' progress billings for payment and maintaining up to date accounting records in the area of disbursements, receipts, billings, and incoming invoices; and
- Coordinating general cleanup of the site throughout the construction program and ensuring overall cleanup on completion of the work.

2.4.3.2 BERM Representatives/Regulatory Environmental Support

The BERM Representative/Regulatory Environmental Support is responsible for planning and coordinating all environmental planning tasks including regulatory compliance, CEQA documentation, and environmental permitting. The representative has full technical responsibility for interpreting, organizing, executing, and coordinating assignments. Additional responsibilities include:

- Participating in project planning to provide technical guidance in the environmental planning aspects of the project;
- Reviewing project schedules and identifying environmental planning and regulatory compliance staffing and contracting requirements;
- Ensuring that sufficient and appropriate environmental planning and regulatory compliance resources are used on the project;
- Reviewing and approving environmental planning and regulatory compliance documents prepared by project consultants;
- Submitting environmental planning and regulatory compliance documents to UEB for review and approval; and,
- Reviewing changes and deviations from project scope, budget, or schedule for all regulatory tasks.

2.4.3.3 SFPUC Surveyors

The surveyors are responsible for performing surveying in the area identified in the preliminary engineering report and preparing a topographic map of the area. A survey of the geotechnical exploration locations will also be needed.

2.4.3.4 Public Affairs Representative

The Public Affairs Representative (PAR) is responsible for planning and coordinating the public outreach program, if needed, with responsibility for the major duties provided by the Public Affairs Specialist. The PAR has full technical responsibility for interpreting, organizing, executing, and coordinating assignments related to public participation. Additional major responsibilities include:

- Participating in project planning to provide guidance on required public participation activities for each phase of the environmental study and construction;
- Reviewing project schedules and identifying public participation staffing and contracting requirements;
- Ensuring that sufficient and appropriate public participation resources are used on the project;
- Reviewing and approving public participation documents prepared by project consultants;
- Submitting public participation documents to UEB for review and approval; and
- Reviewing changes and deviations from project scope, budget, or schedule.

2.4.3.5 Land Management Resource Group Representative

The Land Management Resource Group Representative is responsible for interacting with the Project Manager and the Project Engineer to identify and resolve right-of-way issues for the most cost-effective tunnel alignment. Tasks may include:

- Review of titles, records, parcel maps, etc.
- Providing help to the SFPUC PM in negotiating right-of-way and/or easements.

2.4.3.6 Legal Counsel

The Legal Counsel drafts and reviews all legal documents for the project and provides advice on a continuing basis to the Project Team members regarding the legal aspects of the project.

2.4.3.7 Health and Safety Advisor/Inspector

The Health and Safety Advisor/Inspector should provide, both prior to and during construction, safety training and inspection per Cal OSHA and other pertinent health and safety requirements for all construction site workers.

2.4.4 Specialists Project Team

Project Specialists are required to provide technical expertise that UEB does not have in-house or augmenting the UEB staff. Consultants/Specialists are required for the following primary activities:

- Project Management Specialist to provide project management services to assist the UEB PM and UEB PE in their responsibilities throughout the project;
- Environmental Specialist to provide environmental expertise to prepare the EIR and provide support for SFPUC with the initial study;
- Public Outreach Specialist to implement public outreach activities in accordance with the project public outreach program;
- Geotechnical Engineer to provide geotechnical engineering expertise;
- Tunnel Designer to provide design expertise, which includes the design drawings, specifications, and construction cost estimate for the tunnel and associated facilities construction; and
- Construction Management Consultant to provide construction management services to assist the UEB RE during construction, to develop engineer's estimates and provide input to staffing requirements.

3 PROJECT TASKS

3.1 *Task Descriptions*

The activities included in the above-mentioned project phases will be discussed below with general tasks, like project management and cost and schedule monitoring, to be discussed separately.

3.1.1 Task 1 – Project Management

The SFPUC PM, with the assistance of the Project Management Specialist, will identify project requirements and obtain resources required to complete all work. The SFPUC PM will plan, organize, direct, and control project activities; coordinate UEB, Consultants, San Mateo County, and other City agencies' work; monitor the quality of all work, schedule, and budget; make strategic decisions regarding project approach and implementation; oversee implementation of all technical tasks, environmental permits, design, and construction; obtain approvals on final plans and specifications from Department/Bureau Managers; participate in public meetings; manage bidding, award, and construction activities; authorize payments to Consultants and other outside agencies; and manage close out activities.

3.1.2 Task 2 – Project Schedule and Cost Tracking

During preliminary engineering, initiation of pre-design and detail design, pre-design and detail design, the Project Management Consultant with the assistance of the SFPUC Project Engineer (PE) should regularly update the project schedule and cost estimates, and during construction. During construction, this task should be performed jointly by the RE, the Project Management Consultant, and the Construction Management Consultant. The project schedule identifies all project tasks, required timelines, and dependencies of each task with cost estimates associated with each task.

3.1.3 Task 3 – Preliminary Engineering (Phase I)

During preliminary engineering, completed simultaneously with this Project Management Plan, the surveying requirements, geotechnical investigation scope, tunnel design criteria, preliminary cost estimate and construction schedule were identified in a Preliminary Engineering Report prepared by the SFWA. This information will be used to generate work plans to develop the request for proposals (RFPs) for the primary geotechnical investigation, siphon evaluation, and project detail design.

3.1.4 Task 4 – Initiation of Pre-Design and Detail Design (Phase II)

After preliminary engineering, work plans should be developed for the survey, the primary goetechnical investigation, the siphon evaluation, and detail design. Additionally, support should be provided to the SFPUC PM from the Project Management Specialist for initiation of the environmental activities and right-of-way discussions.

The Project Management Consultant should assist the SFPUC PM and the UEB PE in writing the Request for Proposals for the pre-design and detail design activities after submittal of the pre-design and design work plans.

3.1.5 Task 5 – Pre-Design – Surveying (Phase III)

As part of the preliminary engineering task, surveying requirements were defined. Prior to performing the surveying, coordination should be done to prepare for the work. Once the surveying is completed, a topographic map should be prepared delineating the area defined, with more specific contour intervals at the shaft locations. A survey of the geotechnical boring locations will also be needed. The SFPUC PM, UEB PE and the Project Management Specialist should coordinate with the SFPUC Surveyors to perform this work. Outside assistance may be required for generation of topographic maps from available aerial photographs.

3.1.6 Task 6 – Pre-Design - Right of Way (Phase III)

3.1.6.1 Task 6.1 – Obtain Entry Permits for Geotechnical Investigation

Prior to the NTP for the geotechnical investigation, the SFPUC, with the assistance of the Project Management Specialist, should acquire the requisite entry permits for the area delineated during the preliminary engineering. The entry permits should be available for the Geotechnical Engineer upon issuance of NTP.

3.1.6.2 Task 6.2 – Right of Way Acquisition and Negotiation of Easements

Based on the assumptions from the preliminary engineering report, there will likely be right-of-way issues and/or easement negotiations required near the northern end of the tunnel where it crosses Polhemus Road. SFPUC PM, with input from San Francisco Land Management and assistance from the Project Management Specialist, should negotiate with San Mateo County and the area property owners for either San Francisco County right-of-way or an easement under their property for tunnelling activities. The right-of-way or easement may include an agreement to compensate property owners and San Mateo County. This compensation should be negotiated between property owners, San Mateo County, SFPUC staff, and the City Attorney's Office. Approvals should be obtained from SFPUC to execute the agreement.

3.1.7 Task 7 – Pre-Design - Primary Geotechnical Characterization (Phase III)

3.1.7.1 Task 7.1 – Perform Geotechnical Characterization

Retain a Geotechnical Engineer to perform the primary geotechnical characterization. The primary geotechnical characterization scope prepared by the SFWA as part of the preliminary engineering package contains details for the anticipated geotechnical tasks. These tasks include: site geotechnical studies, development of a geotechnical characterization plan, detailed site exploration (which includes in-situ and laboratory testing program requirements), geotechnical data interpretation and evaluation, and geotechnical report preparation. Additionally, an evaluation of the seismic slope stability along the Crystal Springs Bypass Pipeline alignment should also be included as part of the primary geotechnical investigation.

3.1.7.2 Task 7.2 – Develop Groundwater Monitoring Plan

A groundwater monitoring plan should be developed by the Geotechnical Eengineer, in collaboration with the SFPUC, to monitor monthly and seasonal fluctuations in the groundwater levels prior to design completion and construction. Groundwater observation wells should be installed in most of the borings drilled at the site.

3.1.8 Task 8 – Pre-Design - Siphon Evaluation (Phase III)

The SFPUC Project Team, with the Civil/Pipeline Engineer Specialist, should evaluate the condition of the siphon with input from WS&TD. The evaluation of the siphon should include an inventory of its condition as well as an assessment of its seismic vulnerability and of the geotechnical conditions around the siphon. The geotechnical evaluation of the siphon should be included as part of the primary geotechnical investigation program done prior to design.

3.1.9 Task 9 – Pre-Design – Environmental and Public Outreach (Phase III)

3.1.9.1 Task 9.1 – Start-up of Environmental Studies, Preparation of the Request for Proposal (RFP), and Issuance of the NTP

Prior to issuance of the NTP, BERM should work with the SFPUC PM and the Project Management Consultant for start-up of the Environmental Studies and Public Outreach Program. A preliminary project description and engineering plans are needed prior to start-up to define the extent of the environmental studies, which should include shaft locations, staging areas, etc., including all areas of anticipated disruption. More detailed project description information will be needed as soon as possible, including site plans, cross-sections, construction methods, and haul routes. This preliminary project information is available in the Preliminary Engineering Report prepared by SFWA.

BERM, with the assistance of the SFPUC PM and the Project Management Consultant, should prepare the RFP to initiate the environmental tasks. Information used to prepare the RFP should be culled from the Preliminary Engineering Report prepared by SFWA.

3.1.9.2 Task 9.2 – Perform Background Environmental Studies

The Environmental Specialist, with the assistance of BERM, should perform the background environmental studies. The studies should include preliminary agency coordination, and initiation of biological resource, cultural resource, and traffic studies.

3.1.9.3 Task 9.3 – Develop Public Outreach Program (if needed)

SFPUC, with input from the City's Public Affairs Representative, should hire a Public Affairs Specialist to prepare a Public Outreach Plan for the tunnel project (this can be included in the Environmental RFP). The Specialist should prepare a preliminary draft plan for review and comment by the SFPUC. Comments received from the SFPUC should be addressed and a draft plan should be submitted to the SFPUC. The final program plan should be issued for a 30-day public review period and the SFPUC should address public comments received.

The Public Affairs Specialist, in cooperation with the City's Public Affairs Representative, should implement the planned public outreach activities described in the plan.

3.1.9.4 Task 9.4 – Perform Initial Study

Prepare an Initial Study/Mitigated Negative Declaration (IS/MND). The project description and Initial Study should be developed by SFPUC in accordance with CEQA and MEA guidelines to evaluate potential on- and off-site impacts associated with the project. Descriptions should include location and boundaries of the project area, jurisdictional authority over the project area, and narrative, tabular, and graphic descriptions of the technical and environmental characteristics of the project. Project objectives should be clearly stated and an overview of the approval process for the project should be provided. All agencies with permit authority and concerns related to the project should be listed with summaries of their requirements and relative policies. Potential mitigation measures for a Mitigated Negative Declaration (MND) should be incorporated into the Initial Study.

3.1.9.5 Task 9.5 – Prepare EIR

The Environmental Specialist should prepare an environmental impact report (EIR) for the project site. The Environmental Specialist should prepare a preliminary draft for SFPUC and BERM review, a draft, and a final EIR for certification. Based on CEQA requirements, public review and hearings will be required prior to final EIR certification.

3.1.9.6 Task 9.6 – Incorporate Public and Agency Comments

Members of the public and other interested agencies should be invited to comment on the IS/MND during the required 30-day review period. At the end of this review period, the Environmental Specialist and SFPUC should consider all substantive comments and the Environmental Specialist should make needed changes to complete the MND.

3.1.9.7 Task 9.7 – Develop Mitigation Monitoring and Reporting Program

The Environmental Specialist will prepare a Mitigation Monitoring and Reporting Program (MMRP) as a separate document. The MMRP will identify the steps required to implement mitigation measures identified in the EIR, personnel responsible for implementing mitigation measure(s), the monitoring and reporting schedule, plan check requirements, and methods to verify or certify implementation of each measure.

3.1.9.8 Task 9.8 – Implement Public Participation Activities

Prepare a Public Participation Plan for the entire design and construction project. The Public Affairs Specialist should prepare a preliminary draft plan for review and comment by the SFPUC. Comments received from the SFPUC should be addressed and a draft plan should be submitted to the SFPUC for transmittal to BERM and other applicable agencies. The Public Affairs Specialist should address all agencies' comments, and should submit a final plan to the SFPUC. The final plan should be issued for a 30-day public review period and the SFPUC will address public comments received.

3.1.9.9 Task 9.9 – Obtain Environmental Permits

This task includes obtaining environmental permits required by the US Army Corps of Engineers (US COE), US Fish and Wildlife Service, Fish and Game Department, and Regional Water Quality Control Board, and all other necessary permits. The following are subtasks of this effort:

> Army Corps of Engineers - The SFPUC may be required to deliver a draft Pre-Construction Notification to the US Army Corps of Engineers for construction activities that would be conducted within jurisdictional waterways.
>
> US Fish and Wildlife Service - The US Army Corp of Engineers and SFPUC may be required to conduct a formal Section 7 consultation with the US Fish and Wildlife Service (USFWS). Additional biological assessments may be required prior to initiation of construction, and mitigation measures may be required during construction to avoid potential take of endangered species at the site. If consultation is required, after its completion, the USFWS will issue a Letter of Concurrence or Biological Opinion, which will include any requirements for additional assessment work and mitigation.
>
> California Department of Fish and Game - SFPUC should initiate consultation with California Department of Fish and Game (DF&G) staff regarding requirements under the California Endangered Species Act. DF&G may defer to USFWS on endangered species issues, but may require that the site be revegetated with native species, and may require a vegetation monitoring program.
>
> Water Quality Certification (if needed) - Upon completion of CEQA review, the SFPUC may be required to submit an application for water quality certification to the RWQCB.

3.1.10 Task 10 – Detail Design (Phase IV)

3.1.10.1 Task 10.1 – Supplemental Survey

A supplemental survey may be required by the Tunnel Designer to address any data gaps in the original survey or for more refined data once the tunnel shaft locations have been identified.

3.1.10.2 Task 10.2 – Supplemental Geotechnical Investigation

A supplemental geotechnical investigation may be required during design, with the plan developed by the Tunnel Designer to fill any data gaps, and vary the geotechnical design assumptions and parameters.

The purpose of the supplementary geotechnical investigation is additionally intended to enable the tunnel design and geotechnical characterization to be integrated so that the claims during construction may be minimized. The supplemental geotechnical characterization should be performed under the direction of the Tunnel Designer.

3.1.10.3 Task 10.3 – Utility and Road Relocation Design

The Tunnel Designer, with the assistance of the SFPUC/UEB, should provide any necessary design for existing road and/or utility relocation to accommodate the proposed facilities. This should also include coordination with and approval from the applicable agencies that will be involved (i.e. San Mateo County).

3.1.10.4 Task 10.4 – Perform Tunnel and Shaft Design Documents

The Tunnel Designer, with documented several years experience in tunnel design, should develop the detail design, including the shaft design and connections with the existing system. The drawings and specifications, estimates, and schedules produced from the detail design should be incorporated into contract documents for use in construction of the project facilities. The detail design should be based on the criteria specified in the preliminary engineering evaluation.

3.1.10.5 Task 10.5 – Procure Tunnel Muck Disposal Site

Based on the information provided in the Preliminary Engineering Report, prepared by the SFWA, the Tunnel Designer, with the assistance of SFPUC/UEB, should procure a disposal site for the tunnel and shafts muck. It is possible that with research the materials may be sold as fill to another site or reused in another simultaneous construction project. Otherwise, the muck should be disposed of properly in a landfill or adjacent to the south shaft.

3.1.10.6 Task 10.6 – Coordination with Operations

During tunnel design, the Tunnel Designer, with the assistance of the SFPUC PM, should continually interface with operations to ensure that the design meets operational requirements and minimize any impacts to the existing system from the design.

3.1.10.7 Task 10.7 – Develop Plan to Protect Existing Water Supply and Supply Facilities

A plan should be developed by the Tunnel Designer to ensure adequate protection of the existing water supply and supply facilities during construction.

3.1.10.8 Task 10.8 – Obtain HRC Goals

The SFPUC PM, UEB PE, and the HRC Compliance Officer should establish achievable subcontracting goals based on (1) the engineer's estimate, (2) the most recent MBE/WBE availability charts, (3) a MBE/WBE subcontracting goals worksheet. The PM should ensure that the HRC Contract Compliance Officer attends the pre-bid and pre-construction meetings to explain the MBE/WBE program and offer assistance to Contractor's to meet HRC requirements. The PM is responsible for ensuring that the Contractor meets the requirements of the contract and for submitting the Contractor's completed HRC Forms 7, 8, 9 to the HRC Contract Compliance Officer.

3.1.10.9 Task 10.9 – Prepare Contract Documents

The Tunnel Designer should prepare contract documents in accordance with the design drawings and specifications to be used for construction of the tunnel. The contract

documents should reviewed and approved by the SFPUC Project Team and WS&TD representatives prior to acceptance for use in construction.

3.1.11 Task 11 – Procurement (Phase V)

3.1.11.1 Task 11.1 – Assemble Complete Design Package

The UEB PE should compile the technical plans and specifications, general provisions, and special provisions into one contract package for construction activities related to tunnel construction; conduct in-house and client reviews; incorporate, address, and resolve all significant comments from in-house staff, clients, and other outside agencies whose input is valuable to the project; and, obtain all approvals from Civil Section and GED Managers.

3.1.11.2 Task 11.2 – Coordinate Bid and Award

The SFPUC PM should obtain Commission approval to advertise; conduct public outreach; host pre-bid meeting; open and evaluate bids; resolve bid protests; obtain approval to award contract; oversee execution of contract agreement; and, establish Notice-To-Proceed.

3.1.11.3 Task 11.3 – Review Bids/Ensure HRC Goals Are Satisfied

All bids should be reviewed by the SFPUC Project Team to ensure that all HRC goals have been satisfied prior to issuance of the NTP for construction to minimize any potential delays.

3.1.12 Task 12 – Construction (Phase VI)

3.1.12.1 Task 12.1 – Prepare Construction Permitting Documents and Obtain Permits

Upon Notice of Award, the Construction Contractor should immediately apply for all applicable permits for construction and provide proper notification to the appropriate governmental agency or agencies. Applicable permitting requirements for the Construction Contractor may include, but not be limited to, the following:

- Local excavation and grading permits;
- Permits to relocate roads and/or utilities;
- Permits for hauling and disposal of excavated materials and work generated liquids;
- Environmental permits;
- Bay Area Air Quality Management District (BAAQMD) permits;
- Any other permits that may be required including air emissions permits, highway permits, and re-vegetation permits, noise permits.

3.1.12.2 Task 12.2 – Provide Construction Oversight

The UEB Resident Engineer, with the Construction Management Consultant, should provide construction management activities for all phases of construction, including

coordination with the client operating department (WS&TD) and oversight of Construction Contractor's activities; ensure compliance with plans and specifications; monitor project schedule and budget; process change orders or contract modifications; tracking of muck disposal and manifests; and process Contractor payments.

3.1.12.3 Task 12.3 – Provide Engineering Services During Construction

The Tunnel Designer should provide engineering services activities for all phases of construction to ensure compliance with plans and specifications, and to be available to address any issues raised by the UEB RE or Construction Contractor.

3.1.12.4 Task 12.4 – Provide Construction Management

The Construction Management Consultant should provide construction management services for all phases of construction to support the UEB RE in his/her activities.

3.1.12.5 Task 12.5 – Provide Health and Safety Training and Inspection During Construction

A Health and Safety Advisor/Inspector should provide safety training and inspection prior to and during construction. All construction site workers and visitors should be required to participate in site safety training prior to site accessibility.

3.1.12.6 Task 12.6 – Develop Long-Term Inspection, Monitoring, and Maintenance Plan of Completed Facilities

A long-term inspection, monitoring, and maintenance plan should be developed by the Tunnel Designer, in cooperation with UEB, of the completed facility to ensure proper function, operation, and maintenance.

3.1.12.7 Task 12.7 – Environmental Mitigation and Monitoring

After a Notice of Determination has been issued for CEQA, the Environmental Specialist will prepare a Mitigation Reporting and Monitoring Program for the project. The program will be amended as necessary to include any additional mitigation requirements, which may result from permitting activities performed after the Notice of Determination is issued. This program should be implemented by BERM staff.

3.1.13 Task 13 – Close Out (Phase VII)

3.1.13.1 Task 13.1 – Conduct Contract Close Out

The SFPUC PM and UEB PE, with the Project Management Specialist, should ensure that all work is completed including punch list items (i.e., connection to existing system, pressure testing, disinfection, facility start-up). Obtain bonds, releases, and final documents from Construction Contractor. Obtain SFPUC acceptance of contract and release final payment.

3.1.13.2 Task 13.2 – Prepare Close Out Documents

The SFPUC PM, with the assistance of the Project Management Specialist, should prepare close-out reports which document completion of tunnel and shaft excavation, final lining, backfill of shafts, function of the connections at both ends, proper disposal of

the excavated muck, etc., as well as HRC Forms 7, 8, 9. The close-out documents should be sent to the appropriate regulatory agencies.

4 PROJECT BUDGET

The cost estimate includes all tasks identified in the previous section, as shown below. The total cost is **$49,163,000**.

Table 1: Preliminary Engineer's Cost Estimate

Task #	Title	SFPUC - UEB Cost Estimate	Project Specialist Cost Estimate	Subtotal Cost Estimate	Total Cost Estimate	Comments
1 & 2	Project Management & Project Schedule and Cost Tracking	$2,100,000	2,000,000		$4,100,000	Estimated 6% of construction cost (SFPUC template) for SFPUC and expected PM/Scheduler-Estimator billing rate for Specialist estimate.
3	Phase I – **Preliminary Engineering**					Completed.
4	Phase II – **Initiation of Pre-Design and Detail Design**	$50,000	$150,000		$200,000	Estimate based on anticipated duration, 3 months.
5	Phase III – Pre-Design - **Surveying**	$150,000			$150,000	Estimate based on information from PUC Surveyors.
6	Phase III – Pre-Design - **Right-of-Way**	$300,000	$40,000		$340,000	Estimated 1% of construction cost.
7	Phase III – Pre-Design - **Primary Geotechnical Characterization**		$600,000		$600,000	Information based on geotechnical experience.
8	Phase III – Pre-Design - **Siphon Evaluation**	$100,000	$300,000		$400,000	Estimated 1.2% of construction cost.
9	Phase III – Pre-Design – **Environmental and Public Outreach**				$1,045,000	Estimate based on information from an Environmental Consultant/Public Outreach Consultant.
	Prepare Documents for Environmental	$10,000		$10,000		

Task #	Title	SFPUC - UEB Cost Estimate	Project Specialist Cost Estimate	Subtotal Cost Estimate	Total Cost Estimate	Comments
	Studies, Initiate RFP, Review Proposals, Issue NTP					
	Background Environmental Studies	$10,000	$60,000	$70,000		
	Initial Study	$10,000	$40,000	$50,000		
	Preliminary Draft EIR & City Review	$50,000	$250,000	$300,000		
	Draft EIR		$40,000	$40,000		
	Public Review and Hearings		$40,000	$40,000		
	Final EIR and certification	$50,000	$150,000	$200,000		
	Mitigation Monitoring and Reporting Program	$5,000	$20,000	$25,000		
	Environmental Permits	$10,000	$50,000	$60,000		
	Public Outreach	$100,000	$150,000	$250,000		
10	Phase IV – **Detail Design**				$3,760,000	Estimate based on 10% of construction cost plus supplemental survey and geotechnical investigation.
	Detail Design	$410,000	$3,000,000	$3,410,000		Estimated 10% of construction cost.
	Supplemental Survey	$50,000		$50,000		Estimate based on anticipated survey tasks.
	Supplemental Geotechnical Investigation		$300,000	$300,000		Estimate based on anticipated geotechnical tasks.
11	Phase V - **Procurement**	$340,000			$340,000	Estimated 1% of construction cost.
12	Phase VI - **Construction**				$38,187,000	
	Construction Supervision	$1,700,000		$1,700,000		Estimate 5% of the construction cost, excluding risk and insurance.
	Construction Management		$2,387,000	$2,387,000		Estimate 7% of the construction cost.
	Construction (15% contingency, risk (3.6%) and insurance (0.3%)		$34,086,129	$34,100,000		Includes cost of $4,041/ft of tunnel/lining, 2 shafts, associated

Task #	Title	SFPUC - UEB Cost Estimate	Project Specialist Cost Estimate	Subtotal Cost Estimate	Total Cost Estimate	Comments
	included)					pipework, valves/connections, vaults, mob/demob, structural, mechanical and electrical.
13	Phase VII - **Close-out**	$30,000	$11,000		$41,000	Estimated 1% of the Project Management cost.
	Total Cost Estimate				**$49,163,000**	

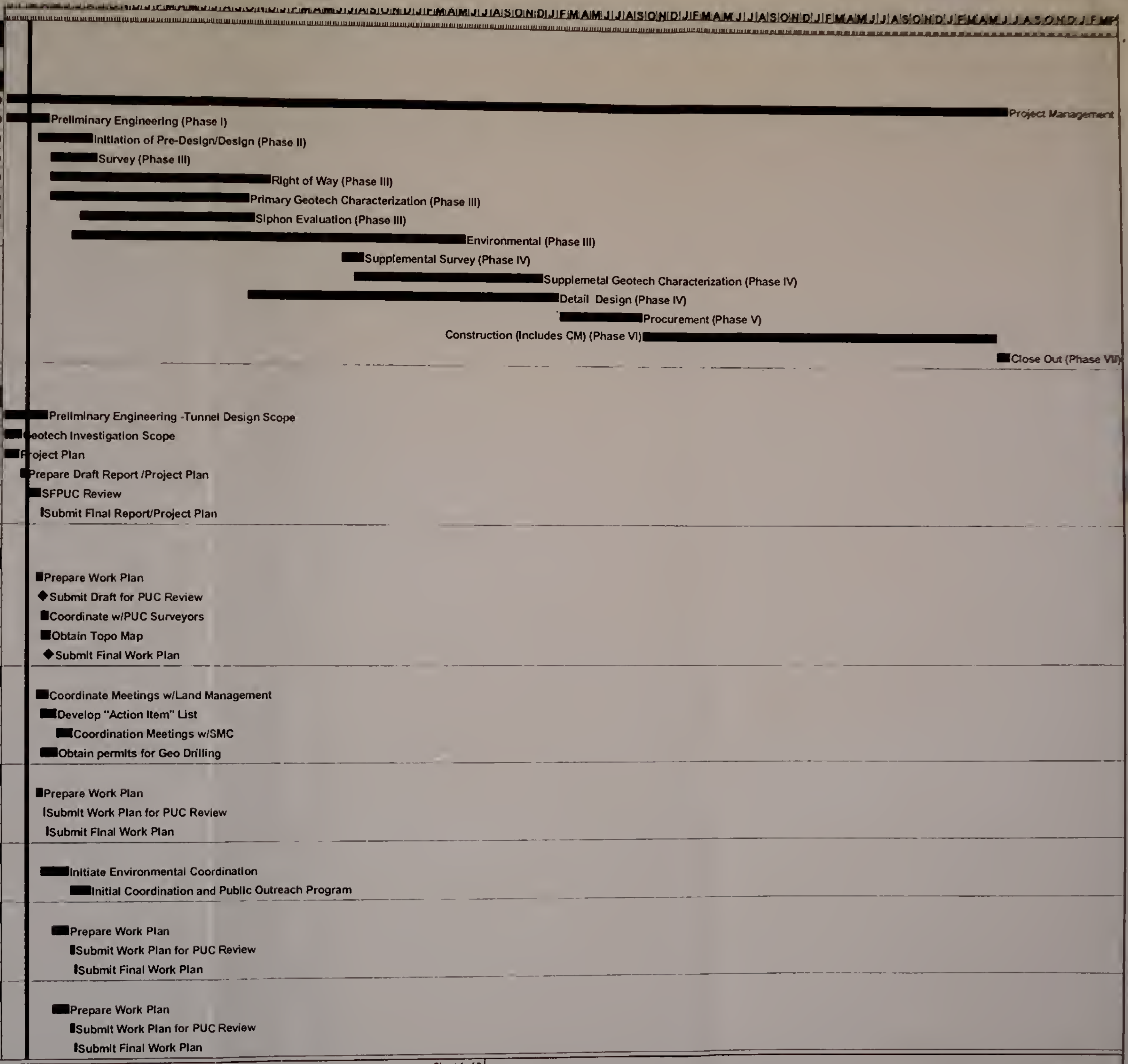
The cost estimate prepared for the CIP was $49,484,000 (unescalated) and $57,234,000 (escalated). The project budget estimate included herein is less than the range of the total installed costs prepared for the CIP.

5 PROJECT SCHEDULE

The project schedule is shown in the figure below.

Figure 3 Project Schedule (attached)

Description	Dur	Start	Finish	Cost
Bypass (Polhemus) Tunnel				
ones & Hammocks				
Project Management (Cost & Schedule Monitoring)	1,946*	07JAN02A	22JUN09	4,100,000
Preliminary Engineering (Phase I)	84	07JAN02A	02MAY02	0
Initiation of Pre-Design/Design (Phase II)	105	01APR02	23AUG02	200,000
Survey (Phase III)	90	06MAY02	06SEP02	150,000
Right of Way (Phase III)	420	06MAY02	12DEC03	340,000
Primary Geotech Characterization (Phase III)	380	06MAY02	17OCT03	600,000
Siphon Evaluation (Phase III)	335	22JUL02	31OCT03	400,000
Environmental (Phase III)	757	01JUL02	24MAY05	1,045,000
Supplemental Survey (Phase IV)	45	21JUN04	20AUG04	50,000
Supplemental Geotech Characterization (Phase IV)	370	26JUL04	23DEC05	300,000
Detail Design (Phase IV)	605	13OCT03	03FEB06	3,410,000
Procurement (Phase V)	161	06FEB06	18SEP06	340,000
Construction (Includes CM) (Phase VI)	695	19SEP06	18MAY09	38,187,000
Close Out (Phase VII)	25	19MAY09	22JUN09	41,000
minary Engineering Phase I				
Engineering				
Preliminary Engineering -Tunnel Design Scope	40	07JAN02A	02MAY02	0
Geotech Investigation Scope	35	07JAN02A	22FEB02A	0
Project Plan	30	07JAN02A	15FEB02A	0
Prepare Draft Report /Project Plan	15	18FEB02A	08MAR02A	0
SFPUC Review	6	08MAR02A	12APR02	0
Submit Final Report/Project Plan	5	15APR02	19APR02	0
tion Of Pre-Design/Design Phase II				
ying Work Plan				
Prepare Work Plan	15	01APR02*	19APR02	0
Submit Draft for PUC Review	0		19APR02	0
Coordinate w/PUC Surveyors	15	15APR02	03MAY02	0
Obtain Topo Map	20	15APR02	10MAY02	0
Submit Final Work Plan	0		03MAY02	0
t of Way Issues				
Coordinate Meetings w/Land Management	25	01APR02*	03MAY02	0
Develop "Action Item" List	30	15APR02	24MAY02	0
Coordination Meetings w/SMC	31	27MAY02	08JUL02	0
Obtain permits for Geo Drilling	31	15APR02	27MAY02	0
ry Geotechnical Investigation Work Plan				
Prepare Work Plan	15	01APR02*	19APR02	0
Submit Work Plan for PUC Review	5	22APR02	26APR02	0
Submit Final Work Plan	5	29APR02	03MAY02	0
onmental Issues				
Initiate Environmental Coordination	55	15APR02*	28JUN02	0
Initial Coordination and Public Outreach Program	40	01JUL02*	23AUG02	0
on Evaluation Work Plan				
Prepare Work Plan	35	13MAY02*	28JUN02	0
Submit Work Plan for PUC Review	10	01JUL02	12JUL02	0
Submit Final Work Plan	5	15JUL02	19JUL02	0
iled Design Work Plan				
Prepare Work Plan	35	13MAY02*	28JUN02	0
Submit Work Plan for PUC Review	10	01JUL02	12JUL02	0
Submit Final Work Plan	5	15JUL02	19JUL02	0



07JAN02
22JUN09
08MAR02
17APR02 15:33

▬ Early Bar
▬ Progress Bar
▬ Critical Activity

PLMZ

Sheet 1 of 3

Crystal Springs Bypass (Polhemus) Tunnel

Date	Revision	Checked	Approved

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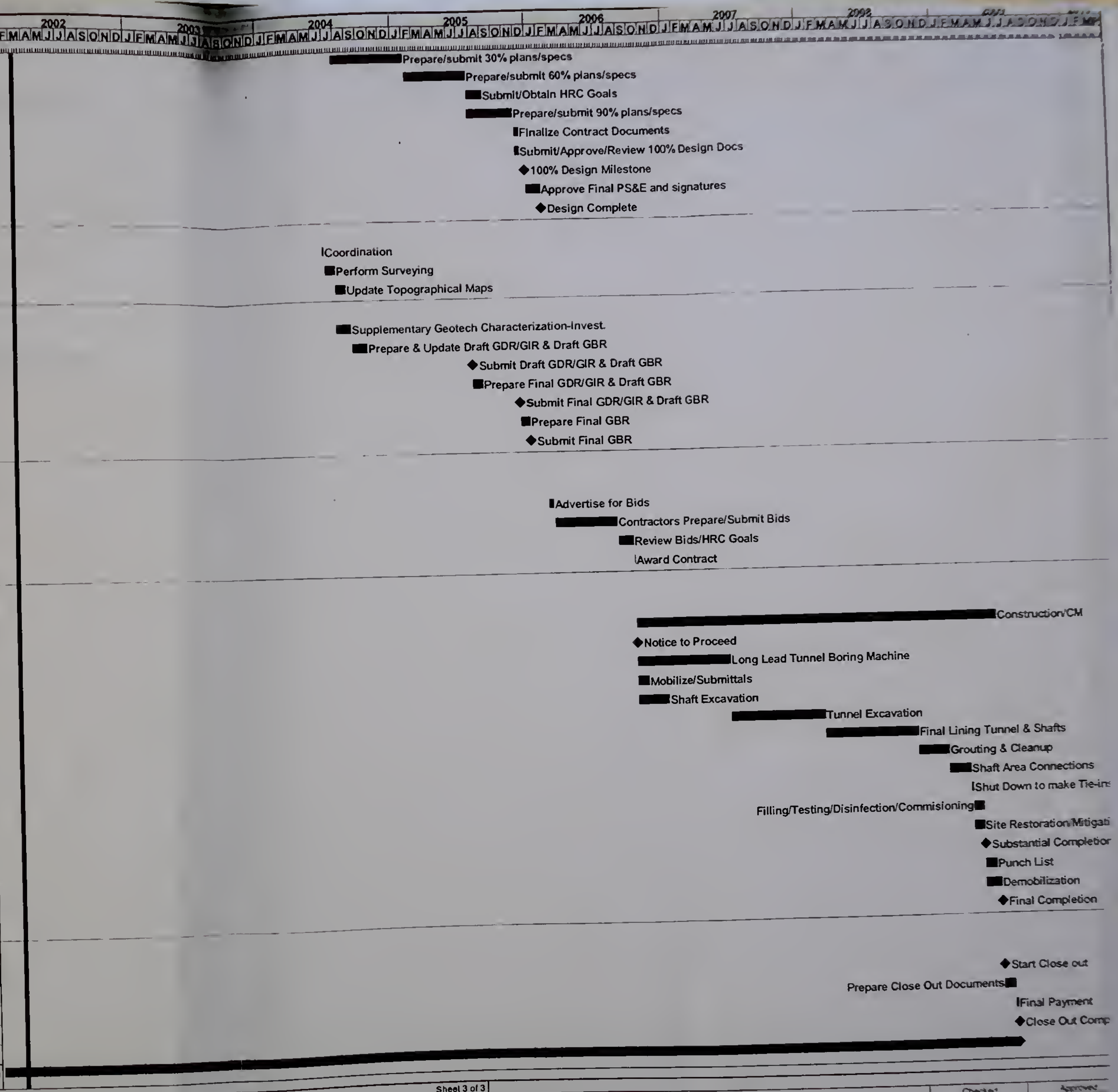
Activity ID	Activity Description	Orig Dur	Early Start	Early Finish	Total Installed Cost
370	Prepare/submit 30% plans/specs	140	26JUL04	04FEB05	0
380	Prepare/submit 60% plans/specs	120	07FEB05	22JUL05	0
390	Submit/Obtain HRC Goals	30	25JUL05	02SEP05	0
400	Prepare/submit 90% plans/specs	90	25JUL05	25NOV05	0
420	Finalize Contract Documents	10	28NOV05	09DEC05	0
460	Submit/Approve/Review 100% Design Docs	10	28NOV05	09DEC05	0
470	100% Design Milestone	0		23DEC05	0
480	Approve Final PS&E and signatures	30	26DEC05	03FEB06	0
490	Design Complete	0		03FEB06	0
Supplemental Survey					
240	Coordination	5	21JUN04	25JUN04	0
250	Perform Surveying	20	28JUN04	23JUL04	0
260	Update Topographical Maps	20	26JUL04	20AUG04	0
Supplemental Geotech Characterization					
276	Supplementary Geotech Characterization-Invest.	30	26JUL04	03SEP04	0
277	Prepare & Update Draft GDR/GIR & Draft GBR	30	06SEP04	15OCT04	0
278	Submit Draft GDR/GIR & Draft GBR	0		22JUL05	0
280	Prepare Final GDR/GIR & Draft GBR	20	25JUL05	19AUG05	0
281	Submit Final GDR/GIR & Draft GBR	0		25NOV05	0
285	Prepare Final GBR	20	28NOV05	23DEC05	0
290	Submit Final GBR	0		23DEC05	0
Procurement Phase V					
Procurement					
500	Advertise for Bids	10	06FEB06	17FEB06	0
510	Contractors Prepare/Submit Bids	120	20FEB06	04AUG06	0
520	Review Bids/HRC Goals	30	07AUG06	15SEP06	0
530	Award Contract	1	18SEP06	18SEP06	0
Construction Phase VI					
Construction					
539	Construction/CM	695*	19SEP06	18MAY09	0
540	Notice to Proceed	0	19SEP06		0
545	Long Lead Tunnel Boring Machine	180	19SEP06	28MAY07	0
550	Mobilize/Submittals	20	19SEP06	16OCT06	0
555	Shaft Excavation	60	19SEP06	11DEC06	0
560	Tunnel Excavation	180	29MAY07	04FEB08	0
561	Final Lining Tunnel & Shafts	180	05FEB08	13OCT08	0
562	Grouting & Cleanup	60	14OCT08	05JAN09	0
563	Shaft Area Connections	40	06JAN09	02MAR09	0
564	Shut Down to make Tie-ins	5	03MAR09	09MAR09	0
565	Filling/Testing/Disinfection/Commisioning	20	10MAR09	06APR09	0
566	Site Restoration/Mitigation	20	10MAR09	06APR09	0
570	Substantial Completion	0		06APR09	0
580	Punch List	20	07APR09	04MAY09	0
585	Demobilization	30	07APR09	18MAY09	0
590	Final Completion	0		18MAY09	0
Close Out Phase VII					
Close Out					
600	Start Close out	0	19MAY09		0
610	Prepare Close Out Documents	20	19MAY09	15JUN09	0
620	Final Payment	5	16JUN09	22JUN09	0
630	Close Out Complete	0		22JUN09	0
Total		1,946	07JAN02A	22JUN09	49,163,000



Start Date	07JAN02
Finish Date	22JUN09
Data Date	08MAR02
Run Date	17APR02 15:33

Early Bar
Progress Bar
Critical Activity

PLMZ

Sheet 3 of 3

Crystal Springs Bypass (Polhemus) Tunnel

Date	Revision	Checked	Approved

Foldout